



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,622	10/29/2003	Narasimha R. Valieti	VRT0093US	5515

33031 7590 11/16/2005

CAMPBELL STEPHENSON ASCOLESE, LLP
4807 SPICEWOOD SPRINGS RD.
BLDG. 4, SUITE 201
AUSTIN, TX 78759

EXAMINER

FLOURNOY, HORACE L

ART UNIT	PAPER NUMBER
----------	--------------

2189

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/696,622	VALIETI ET AL.	
	Examiner	Art Unit	
	Horace L. Flournoy	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The instant application having Application No. **10/696,622** has a total of 20 claims pending in the application; there are 5 independent claims and 15 dependent claims, all of which are ready for examination by the examiner.

Information Concerning Oath/Declaration

Oath/Declaration

The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in **37 C.F.R. 1.63**.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-20 are rejected under 35 U.S.C. 102(e) as being anticipated by **Dalal et al. (U.S. PG PUB No. 2004/0123063 hereafter referred to as Dalal)**.

With respect to independent claims 1 and (12),

"A method comprising: a computing node in a network creating a description of a data volume layout," is disclosed in paragraphs [0120] and FIG. 32.

Dalal discloses in **paragraph [0120]**, **"...in which the host to which the user is currently connected appears as a node."** Dalal teaches a computing node. FIG. 32 teaches a computing node in a network. Dalal discloses in **paragraph [0114]**, **"Intent 1122 captures information such as user requirements 1102B, including high-level descriptions of characteristics requested of the logical volume (i.e., "provide high performance") and/or rules or capabilities used to configure the logical volume for an intended use."**

"...wherein the data volume is composed from two or more data storage devices on the network;" is disclosed in paragraph [0005].

Dalal discloses in **paragraph [0005]**, **"Most large businesses have a wide variety of application programs managing large volumes of data stored on many different types of storage devices across various types of networks and operating system platforms. These storage devices can include tapes, disks,**

optical disks, and other types of storage devices and often include a variety of products produced by many different vendors."

"...first, second and third devices storing a copy of the data volume layout description or respective modified versions thereof in respective memories of the first, second and third devices;" is disclosed in FIG. 22 and paragraphs [0271]-[0273].

In **FIG. 22**, Dalal teaches the use of three disks that store a copy of the data volume layout description or respective modified versions thereof in respective memories of each of the three devices.

"...transmitting data input/output (I/O) transactions between the first device and the second device; transmitting data (I/O) transactions between the first device and the third device." is disclosed in paragraph [0214]

Dalal discloses in **paragraph [0214]**, **"With scatter-gather I/O, all requests to one subdisk can be combined into a single contiguous I/O to the subdisk, although the data is placed in several non-contiguous regions in memory."** Dalal also discloses in **paragraph [0027]**, **"By placing data on multiple disks, I/O operations can overlap in a balanced way, improving performance."**

Dalal teaches I/O operation between all devices.

With respect to claims 2 and (13),

"The method of claim 1 wherein the data volume layout description relates virtual storage objects of the data volume to other virtual storage objects of the data volume." is disclosed in paragraphs [0018]-[0022] and [0085].

Dalal discloses in **paragraph [0022]**, **"None of the associations described above between virtual objects making up logical volumes are permanent; the relationships between virtual objects can be changed. For example, individual disks can be added on-line to increase plex capacity, and individual volumes can be increased or decreased in size without affecting the data stored within."**

Dalal teaches the data volume layout description (**paragraphs [0085] and [0018]**) relates virtual storage objects **[The relationships between virtual objects]** of the data volume **[virtual objects making up logical volumes]** to other virtual storage objects of the data volume.

With respect to claims 3 and (14),

"The method of claim 1 wherein the data volume layout description relates virtual storage objects of the data volume to one or more data storage systems of the network." is disclosed in paragraphs [0086] and [0102], FIG. 10, elements 1015 and 1019, and claim 2 above.

Dalal discloses in **paragraph [0086]**, **"In "Obtain Available Storage Information" step 820, information is gathered about the available storage for implementing the user requirements. This information can be gathered from**

Art Unit: 2189

storage devices directly attached to the host running the system software, via a network from other hosts directly attached to other storage devices, and from servers on a storage area network.” Dalal also discloses in paragraph [0102], “Storage information collector 1015 collects information from hosts for storage devices, such as host 1016 for storage device 1017, storage array 1018, and storage area network 1019.”

With respect to claims 4 and (15),

“The method of claim 1 wherein the first device comprises a host node, wherein the second device comprises a first data storage system that stores a first portion of data of the data volume, and wherein the third device comprises a second data storage system that stores a second portion of data of the data volume.” is disclosed in FIG. 1, elements 110 and 130, and paragraph [0013].

Dalal discloses in paragraph [0013], **“Storage array 130 is a multi-path array of multiple storage devices, of which storage device 136 is an example. Storage array 130 is connected to fibre channel network 122 via array port 132.”**

Dalal teaches in **FIG. 1** a host node [**Host element 110**] (first device). The second and third devices are taught in [**Storage Array element 130**] (first/second data storage systems). Also, Dalal teaches in **FIG. 32** clients (elements 3210, 3220, 3230) as well as devices (elements 3260A/B), which are each interpreted as first/second data storage systems.

With respect to claim 5,

“The method of claim 1 wherein the computing node is contained within the first, second, or third device.” is disclosed in paragraph [0309], and FIG. 32, elements 3210, 3220 and 3230.

Dalal discloses in paragraph [0309], **“Client systems 3210, 3220 and 3230 are able to access information on storage server 3240A or 3240B using, for example, a web browser or other client software (not shown). Such a client allows client systems 3210, 3220 and 3230 to access data hosted by storage server 3240A or 3240B or one of storage devices 3260A(1)-(N), 3260B(1)-(N), 3280(1)-(N) or intelligent storage array 3290.”**

Dalal teaches that the computing node is contained within the first, second, or third device **[Client systems 3210, 3220 and 3230]**.

With respect to claim 6,

“The method of claim 1 wherein the first device comprises a host node, wherein second device comprises a data storage system that stores a portion of data of the data volume, and...” is disclosed, as **stated above, in claim 4.**

“... wherein the third device comprises a switch coupled between the host node and the data storage system.” is disclosed in **FIG. 1 element 120.**

Art Unit: 2189

Dalal teaches a third device that comprises a switch **[Switch element 120]** coupled between the host node **[Host element 110]** and the data storage system **[Storage Array 130]**.

With respect to claims 7, (16), and (17),

"The method of claim 4 further comprising: the host node generating a write I/O transaction to write new data, wherein the write I/O transaction comprises the new data" is disclosed in paragraph [0036] and FIG. 11.

Dalal discloses in **paragraph [0036]**, **"...the disk arrays have independent I/O paths to the host computer so that there is no single point of failure."**

Dalal teaches the host node **[host computer]** has independent I/O paths to the disk arrays for requests.

[Note: The examiner interprets the limitations "generating" followed by "transmitting" a transaction as a request.] See below. Also the limitation "new data" is interpreted as new data to the system or new data to the particular host.

"...the host node transmitting the write I/O transaction to only the first data storage system;" is disclosed in paragraph [0217].

Dalal discloses in **paragraph [0217]**, **"...each request is not likely to finish at exactly the same time (because each disk does not receive identical I/O requests--each disk gets a different set of read requests)..."**

Art Unit: 2189

Dalal teaches the host node transmits **[request]** the write I/O transaction **[I/O request]** to only the first data storage system **[each disk gets a different set of read requests]**.

"...after receiving the write I/O data transaction, the first data storage system generating another transaction to write the new data;" is disclosed in paragraph [0217].

Dalal discloses in paragraph [0217], **"...write requests cannot be issued in parallel, but happen one after the other."**

"...the first data storage system transmitting the other transaction to the second data storage system." is disclosed supra. **[See Note above]**

With respect to claims 8 and 9,

"The method of claim 7 further comprising the first data storage system accessing the data volume layout description or the modified version thereof stored in memory of the first data storage system in response to receiving the write I/O transaction."

and

"The method of claim 8 further comprising the second data storage system accessing the data volume layout description or the modified version thereof stored in memory of the second data storage system in response to receiving the other transaction." is disclosed in paragraph [0217].

The examiner interprets the limitations “first data storage system” and “second data storage system” of claims 8 and 9, respectively, as a storage system.

Dalal discloses in paragraph [0217], “Each logical write must be translated to n physical writes to each of the n mirrors. All n writes can be issued concurrently, and all will finish in about the same time.”

Dalal teaches in response to receiving a write I/O transaction or transaction [logical write], the data volume layout description of the storage system is accessed from that storage system’s memory [Each logical write must be translated to n physical writes to each of the n mirrors].

With respect to claim 10,

“The method of claim 4 further comprising: the host node generating a write I/O transaction to write new data, wherein the write I/O transaction comprises the new data; the host node transmitting the write I/O transaction to the first data storage system;” is disclosed in **claim 7** above.

“...after receiving the write I/O data transaction, the first data storage system accessing the data volume layout description or the modified version thereof stored in memory of the first data storage system;” is disclosed in **claim 8** above.

“... after accessing the data volume layout description or the modified version thereof stored in memory of the first data storage system, the first data storage

system writing all the new data to separate memory locations within the first data storage system.” is disclosed in paragraph [0217].

Dalal discloses in **paragraph [0217]**, **“Each logical write must be translated to n physical writes to each of the n mirrors. All n writes can be issued concurrently, and all will finish in about the same time.”**

Dalal teaches writing all the new data to separate memory locations within the first data storage system **[Each logical write must be translated to n physical writes to each of the n mirrors]**.

With respect to claims 11 and (17)

“The method of claim 1 further comprising: the computing node modifying the data volume layout description; the first, second and third devices overwriting their respective data volume layout descriptions or their respective modified versions of the data volume layout descriptions with a copy of the modified data volume layout description or the respective modified versions thereof.” is disclosed in paragraph [0299].

Dalal discloses in **paragraph [0299]**, **“...storage allocator software can be used to configure other available hardware to meet the user's functional requirements. The storage allocator can be used at a very low level, by administrators intimately familiar with the features of available storage devices, to provide a high level of control over how logical volumes are configured. In**

addition, the storage allocator provides great flexibility and can also be used by users without detailed technical knowledge.”

Dalal teaches a computing node **[storage allocator]** modifying the data volume layout description **[configure other available hardware]**; the first, second and third devices **[logical volumes]** overwriting their respective data volume layout descriptions or their respective modified versions of the data volume layout descriptions with a copy of the modified data volume layout description or the respective modified versions thereof **[storage allocator software can be used to configure other available hardware to meet the user's functional requirements]**.

[Note: With regards to claims 12-19, please see paragraphs [0312]-[0314], as well as the 35 U.S.C. rejection below, both of which anticipate the use of a computer readable medium to execute functions in hardware as claimed above]

With respect to claims 12-19, Dalal discloses in paragraphs [0312]-[0313], “The foregoing detailed description has set forth various embodiments of the present invention via the use of block diagrams, flowcharts, and examples. It will be understood by those within the art that each block diagram component, flowchart step, operation and/or component illustrated by the use of examples can be implemented, individually and/or collectively, by a wide range of hardware, software, firmware, or any combination thereof...The present invention has been

described in the context of fully functional computer systems; however, those skilled in the art will appreciate that the present invention is capable of being distributed as a program product in a variety of forms, and that the present invention applies equally regardless of the particular type of signal bearing media used to actually carry out the distribution. Examples of signal bearing media include recordable media such as floppy disks and CD-ROM, transmission type media such as digital and analog communications links, as well as media storage and distribution systems developed in the future.”

With respect to independent claim 12,

“A computer readable medium storing computer executable instructions, wherein a method is performed by a first device within a network in response to the first device executing the computer executable instructions, the method comprising: the first device transmitting a first copy of a description of a data volume layout or a modified first copy of the data volume layout description to a second device in the network, wherein data of the data volume is stored in two or more data storage systems of the network; the first device transmitting a second copy of the data volume layout description or a modified second copy of the data volume layout description to a third device in the network; the first device transmitting input/output (I/O) transactions to the second and third devices.” is disclosed as stated supra in **claim 1**.

With respect to claim 13,

"The computer readable medium of claim 12 wherein the data volume layout description relates virtual storage objects of the data volume to other virtual storage objects of the data volume." is disclosed as **stated supra in claim 2.**

With respect to claim 14,

"The computer readable medium of claim 12 wherein the data volume layout description relates virtual storage objects of the data volume to one or more data storage systems of the network." is disclosed as **stated supra in claim 3.**

With respect to claim 15,

"The computer readable medium of claim 12 wherein the first device comprises a host node, wherein the second device comprises a first data storage system that stores a first portion of data of the data volume, and wherein the third device comprises a second data storage system that stores a second portion of data of the data volume." is disclosed as **stated supra in claim 4.**

With respect to claim 16,

Art Unit: 2189

"The computer readable medium of claim 15 wherein the method further comprises: the host node generating a write I/O transaction to write new data, wherein the write I/O transaction comprises the new data; the host node transmitting the write I/O transaction to only the first data storage system." is disclosed as **stated supra in claim 7.**

With respect to claim 17,

"The computer readable medium of claim 12 wherein the method further comprises: the first device modifying the data volume layout description to create a modified data volume layout description;" is disclosed as **stated supra in claim 11.**

"...the first device transmitting a copy of the modified data volume layout description or a modified version thereof to the second device." is disclosed as **stated supra in claim 7.**

With respect to independent claim 18,

"A computer readable medium storing instructions, wherein the instructions are executable by a processor in a second device in a network containing a first device, the second device, and a third device, wherein the network stores a data volume, wherein the first device is configured to transmit I/O transactions to the

second device, and wherein the first device is configured to transmit I/O transactions to the third device, the method comprising:” is disclosed as **stated supra in claim 1.**

“... the second device receiving and storing in memory thereof a description of a data volume layout created and transmitted by the first data device; is disclosed as stated supra in claim 1.

“...the second device receiving an write I/O transaction from the first device, wherein the write I/O transaction comprises data D;” is disclosed as stated supra in claim 8.

The examiner interprets the limitation “data D” as a data element or data.

“...after receiving the write I/O transaction, the second device generating another transaction to write data D; the second device transmitting the other transaction to the third device.” is disclosed as stated supra in claim 7.

With respect to independent claim 19,

“A computer readable medium storing instructions, wherein the instructions are executable by a processor in a second device in a network containing a first device, the second device, and a third device, wherein the network stores a data volume, wherein the first device is configured to transmit I/O transactions to the second device, and wherein the first device is configured to transmit F0

transactions to the third device, the method comprising:" is disclosed as **stated supra in claim 1.**

"...the second device receiving and storing in memory thereof, a description of a data volume layout created and transmitted by the first data device; the second device receiving an write I/O transaction from the first device, wherein the write I/O transaction comprises data D..." is disclosed as **stated supra in claims 1 and 8.**

"... in response to receiving the write I/O data transaction, the first second device accessing the data volume layout description or the modified version thereof stored in memory of the first device; in response to accessing the data volume layout description or the modified version thereof stored in memory of the second device, the second device writing data D to separate memory locations within the second device." is disclosed as **stated supra in claim 10.**

With respect to independent claim 20,

"A network comprising: a first device coupled to second and third devices, wherein the first device is configured to transmit I/O data transactions to the second and third devices;" is disclosed as **stated supra in claim 1.**

"...wherein the first device is configured to create a description of a data volume layout, wherein data of the data volume is stored in two or more data storage systems of the network; wherein the first device is configured to store the data

Art Unit: 2189

volume layout description in memory of the first device; wherein the second and third devices are configured to store a copy of the data volume layout description or respective modified versions thereof in respective memories of the second and third devices." is disclosed as **stated supra in claim 1.**

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere CO.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 12-19, in light of the rejections stated above, are further rejected under 35 U.S.C. 103(a) as being obvious over **Dalal et al. (U.S. PG PUB No. 2004/012306)** in

Art Unit: 2189

view of **“Structured Computer Organization” 2nd edition, by Tanenbaum (hereafter referred to as Tanenbaum).**

With further respect to independent claims 12, 18, and 19, as well as dependent claims 13-17, Dalal does not disclose expressly, *“computer readable medium...”*

Tanenbaum discloses, ***“Hardware and software are logically equivalent. Any operation performed by software can also be built directly into the hardware and any instruction executed by the hardware can also be simulated in software”*** **(page 11).**

Dalal and Tanenbaum are analogous art because they are from the same field of endeavor, that being computer architecture.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement a method of claims 1-11 (hardware) as a computer readable medium to arrive at claims 12-19.

The motivation for doing so would have been obvious based on the teaching of Tanenbaum on **page 11**, ***“Hardware and software are logically equivalent. Any operation performed by software can also be built directly into the hardware and any instruction executed by the hardware can also be simulated in software.”***

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement previous claims 1-11 in software thereby obtaining the inventions as specified in claims 12-19.

CONCLUSION

Status of Claims in the Application

The following is a summary of the treatment and status of all claims in the application as recommended by **M.P.E.P. 707.07(i)**:

Claims rejected in the Application

Per the instant office action, claims **1-20** have received a first action on the merits and are subject of a first action non-final.

Direction of Future Correspondences

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Horace L. Flournoy whose telephone number is (571) 272-2705. The examiner can normally be reached on Monday through Friday 8:00 AM to 5:30 PM (ET).

Important Note

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Sparks can be reached on (571) 272-4201. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 746-7239.

Information regarding the status of an Application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published

Art Unit: 2189

applications may be obtained from either Private PAIR or PUBLIC PAIR. Status information for unpublished applications is available through Private Pair only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2100.

Horace L. Flournoy

Patent Examiner

Art unit: 2189

A handwritten signature in black ink, appearing to read "Dale J. Smith", is written over the printed name "Supervisory Patent Examiner".

Supervisory Patent Examiner

Technology Center 2100